



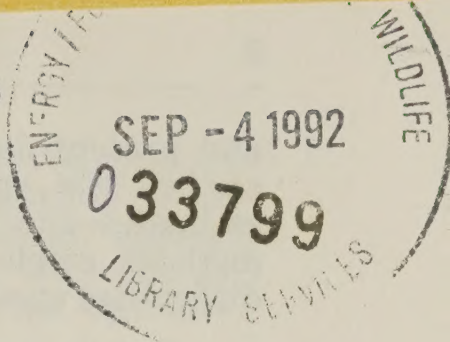
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ALBERTA'S BIG GAME RESOURCES

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Twelve species of big game animals inhabited Alberta in vast numbers during the period of early exploration and fur trade (Table I). The same twelve species can be found in the wild state today. All but one, the buffalo, are still hunted for sport.

TABLE I

Taxonomic Status of the Big Game Inhabiting Alberta, 1958

Common Name	Scientific Name	Recognized Subspecies	Range
A. Cervidae (deer family)			
1. Mule deer	Odocolleus hemlonus	(1) O.h.hemionus	Whole province
2. White-tailed deer	Odocolleus virginianus	(1) O.v.dacotensis	Parkland and prairie
		(2) O.v.ochrourus	Foothills
3. Elk	Cervus canadensis	(1) C.c.nelsoni	Foothills
		(2) C.C.Manitobensis?*	Cypress Hills
4. Moose	Alces americana	(1) A.a.shirasi	Foothills
		(2) A.a.andersoni	Mixed wood forest
5. Woodland caribou	Rangifer caribou	(1) R.c.sylvestris	Mixed wood forest
6. Barren-ground caribou	Rangifer arcticus	(1) R.a.arcticus	NE corner of Prov.
		(2) R.a.fortidens**	Jasper region
B. Bovidae (cattle, sheep family)			
7. Buffalo or bison	Bison bison	(1) B.b.bison	Nat. Parks
		(2) B.b.athabasca	Wood Buffalo Park
8. Bighorn sheep	Ovis canadensis	(1) O.v.canadensis	Rocky mountains
9. Mountain goat	Oreamnos americana	(1) O.a.missoulae	Rocky mountains
C. Ursidae (bear family)			
10. Black or Brown bear	Euarctos americana	(1) E.a.americana	Mixed wood forest
		(2) E.a.cinnamomum	Foothills
11. Grizzly bear	Ursus horribilus	(1) U.h.horribilus	Swan Hills
		(2) U.h. ? ***	Foothills
D. Antilocapridae (antelope family)			
12. Antelope	Antilocapra americana	(1) A.a.americana	Treeless prairies

* Subspecific standing of Cypress Hills elk uncertain.

** Mountain caribou; considered a separate species by some workers.

*** Seven subspecies recorded from foothills region; probably all should be lumped under one; name undecided.

It is to Alberta's credit that so far none of these valuable denizens of the wild have been exterminated. On the debit side of the ledger are some of the drastic reductions in both range and numbers that have occurred among wilderness species.

This report examines the methods of inventory used in Alberta and the results that have been achieved. It outlines former

and present distributions of the eleven indigenous animals, describes the environment they each prefer, gives population estimates and recent survey results, lists some of the census methods employed in Alberta, and describes briefly the major difficulties encountered by those engaged in wildlife survey work.

In it is incorporated material gathered from historical journals, articles and book by early naturalists, status reports by wildlife biologists G. J. Mitchell, J. G. Stelfox and the author, and game reports from Provincial Fish and Game and Forestry Officers. The biologists reports provided much of the material. Others who contributed data on the grizzly, mountain sheep and buffalo were A. F. Oeming, W. D. Wishart, N. Novakowski and C. P. Smith.

The author must be held responsible for the varied interpretations of data and for the population estimates and predictions ventured.

INVENTORY METHODS

A. *Difficulties*

The difficulties involved in obtaining accurate big game population figures in a province as diversified as Alberta are obvious and imposing. In general the success of game counts depends on the time available, the help available in both men and machinery, the size of the area to be covered, the species involved, their habits, and the nature of their environment.

Extensive areas with varied topography and plant cover must be traversed in relatively brief periods. Those completing a forest inventory, for example, have an average span of 100 years in which to finish their task. Wildlife surveys must be done within a small fraction of a year. The high potential rates of yearly increase and decrease inherent in big game populations make haste a necessity.

Wary habits of the animals themselves add to census troubles. Trees will usually stand and be counted while big game animals rarely are that obliging. It is hard to avoid duplication when censusing mobile species such as elk, antelope and caribou. Conversely, the less mobile mule deer and white-tailed deer are by their very secretiveness difficult to observe. For this reason visual estimates of deer by field men and hunters are usually low. Fortunately direct counts from a slow flying airplane at low altitude can be of value in deciduous cover. However, indirect methods of estimating deer population are usually required in dense coniferous habitat.

Antelope would seem to the uninitiated relatively easy to count because of their preference for prairie regions. Nevertheless their extreme winter gregariousness and sudden seasonal movements constitute serious censusing problems. They can only be solved through comprehensive study of the species' behavior.

Likewise bighorn sheep and mountain goats can be tallied *if* their difficult home terrain is conquered and *if* their seasonal distribution is fully known. Needless to say these two *ifs* require considerable diligent effort to overcome.

B. *General Methods*

Notwithstanding the difficulties, one of the foremost endeavours of any wildlife manager is the census of game species. Some indication of either annual abundance or yield is necessary for wise season-setting.

When absolute counts cannot be obtained, indirect methods must be devised and used. Indirect methods involve either "measures of use" or trend data. Measures of use usually take the form of harvest or "kill" figures and changing age ratios within a population. Trend data are those collected in a similar manner from year to year that indicate percentage changes in populations. Trends are usually detected in two ways; yearly range utilization surveys or any one of a number of direct count methods repeated in a similar manner on sample areas. In Alberta the latter are aerial surveys on a transect basis, winter track counts, pellet group counts, and reports from field men.

Absolute counts are not necessary if indirect data is available. Although not as impressive to laymen as absolute figures, indirect counts of the two major types described above are satisfactory for management purposes. The experimental manipulation of seasons to the point of diminishing yields can establish the upper limits of population levels. In this way the final proof is obtained and sustained maximum yields determined.

ALBERTA GAME SURVEY METHODS

In Alberta two wildlife agencies are responsible for big game inventories. The Fish and Wildlife Division of the Provincial Department of Lands and Forests administers and thus must have intimate quantitative knowledge of big game populations in the province as a whole. The Canadian Wildlife Service works in conjunction with the National Parks Service to census game species in the National Parks.

The two agencies have in recent years increased their big game survey activities. A multitude of indirect data has been

obtained and a few absolute counts have been made. A small provincial staff number has forced concentration of effort to regions of high utilization or maximum resource use.

All of the direct counts by provincial biologists have been made south of the 60th parallel. The majority have been from the air of species readily enumerated due to the terrain in which they live or their gregarious behavior.

Biologist George J. Mitchell conducted the first intensive aerial big game survey in Alberta. In the late winter and spring of 1954 he obtained total counts of elk herds in the Crowsnest Forest Reserve and the lower portion of the Bow River Forest Reserve. His method was to randomly search out wintering herds of elk and circle at low altitude until as complete a count as possible was obtained. Similar surveys were repeated in a slightly expanded region in the winters of 1955, 1956 and 1957 by Mr. Mitchell and co-operators.

Additional aerial surveys were begun in the upper portion of the Bow Forest Reserve, the Clearwater Forest Reserve and adjoining regions in the winter and spring of 1956 by R. Webb. The first straight line aerial transects to sample moose populations in Alberta were implemented at this time. Parallel compass lines were followed at an altitude of 300 feet over relatively flat terrain. Complete counts of moose were thus obtained on strips or transects approximately 100 yards wide. Total counts of elk populations were also obtained during the same survey period by random flying. An identical re-survey was completed in 1957 in the same area. Weather conditions permitted only a partial re-survey in 1958.

In the winter of 1957 a limited amount of random deer counting from the air was undertaken in the parkland region east of highway Number 2 by R. Webb. Next year, 1958, saw an extensive aerial deer survey completed in the same region. Eight hundred and fifty-two transects miles were flown. A strip one-eighth of a mile wide was observed for deer. This method proved satisfactory in deciduous cover but unusable in regions in which conifers predominated.

Later in 1958, biologist Mitchell obtained some startling aerial counts of both mule deer and white-tailed deer along the Red Deer and South Saskatchewan Rivers.

In the winter of 1957, J. G. Stelfox commenced aerial transect work in the Pembina River region. Moose trend counts were obtained then and again in March 1958.

Only fragmentary data on antelope numbers had been obtained in the province prior to 1955. In June of that year, Mitchell began an antelope count in conjunction with the U. S. Fish and Wildlife Service aerial waterfowl survey. It was repeated in 1956 and 1957. Then in August, 1957, a more intensive resurvey was completed. It consisted of transects one-half mile wide flown in an east-west direction every 6 miles.

Several ground studies have yielded absolute counts of sheep, mule deer and antelope. G. J. Mitchell, in 1952, established a population estimate of a herd of bighorn sheep in the Gorge Creek area of the Bow River Forest Reserve. The same herd was later the subject of an intensive three year study by W. D. Wishart.

In 1957 and 1958 D. Shepherd achieved a reliable estimate of the mule deer herd in the same region.

Of no little significance have been elk, moose and deer estimates forwarded by Forest Officers and Fish and Game Officers from time to time. Elk counts in the Eastern Rockies Conservation Board area have been particularly valuable as trend information. Even more important because of their uniqueness are counts by field officers in northern regions. The only reasonable estimates of barren-ground caribou numbers received in Edmonton, for example, have been forwarded by Forestry personnel in the northeast corner of the province.

Indirect methods of assessing big game trends and populations have yielded as much or more useful data than direct methods. Compulsory license returns, mail questionnaires and hunter checking stations have provided provincial kill estimates for several species continuously since 1907.

From 1907 to 1950 all hunters were compelled to return their big game licenses on which was noted their success. In 1956 a mail questionnaire was substituted and is still in use. It was designed to eliminate sampling errors inherent in the compulsory return method. A mechanically selected sample of several thousand hunters receives each winter a series of questions about their big game hunting activities of the previous year. If a hunter is tardy with his reply a "follow-up" letter is sent to remind him of his responsibilities.

The first attempt at a province-wide big game inventory on a local or regional basis was made by the late Dr. William Rowan of the University of Alberta. He used a mail questionnaire in the early 1940's to determine general wildlife trends as chosen local

observers saw them. This method, continued for several years, yielded a general picture of regional big game increases or decreases but lacked quantitative exactness.

Hunter checking stations with biological objectives were added to the list of indirect inventory techniques in 1953. Big game check forms were completed by Forest Reserve personnel at Ranger stations during the elk season of that year. Checking stations had previously been employed for enforcement purposes but only occasionally had been used to collect kill data. 1954 saw the development of a more complete check form and the establishment of Fish and Game Branch biological checking stations. Two were operated for twelve days on access roads leading to the newly opened Castle-Carbondale Game Preserve. In addition to the collection of kill data, elk were aged by biologists using as criteria tooth wear and development in lower jaws. These data were used to determine complete population age ratios for the first time in Alberta. Subsequent changes in the prominence of certain age classes reflected changes in the elk population itself and a new indirect inventory method was added to Alberta's list.

Uteri were also collected from cow elk. From them, pregnancy rates were calculated. A whole new field (in Alberta) of "population prediction" began with this step. An estimate of the increment to be added to next year's population was made on the basis of that uteri collection.

In succeeding years additional hunter checking stations were instigated by the Fish and Game Branch along the eastern edge of the Bow and Clearwater Forest Reserves, at Entwistle, Entrance, Whitecourt and along the "Coalbranch". Lower jaw and uteri collections have become integral parts of this operation. Last year, in 1958, checking stations operating 24 hours a day obtained information leading indirectly to the evaluation of moose, deer, elk, sheep and goat populations from at least 50 per cent of Alberta's big game hunters.

Range utilization surveys depict the relationship of big game populations to their food supply. In this manner it is discovered if big game herds are smaller than desired, at an optimum level, or are exceeding the food carrying capacity of their range. Harvests can be adjusted to achieve desirable levels if they do not already exist. Thus range surveys serve as another method of determining the status of big game species without the need of an absolute count.

The first range survey with the specific objective of determining a big game population level was undertaken by J. B. Millar in the Rock Lake area in 1952 and 1953. He studied the food

habits of moose. Since that time a program of regular quantitative range checks has been developed by provincial game biologists on key elk and moose winter ranges along the east slope of the Rocky Mountains from Waterton Lakes National Park to the Athabasca River. Dr. R. Cormack of the Botany Department of the University of Alberta contributed to the success of some of these surveys.

Wildlife students from the University of Alberta have undertaken special exhaustive quantitative and qualitative range analyses on specific mule deer and bighorn sheep ranges in recent years.

BIG GAME HARVESTS

No attempt will be made in this paper to comprehensively evaluate Alberta's big game resources. It is perhaps a theme for another conference. However, a brief summary of both the growth of interest in and use of our big game heritage will be presented. It is hoped to shed some light on the place big game resources deserve in the public's "resource conscious eye" and thus in multiple land use policies.

Table II includes a few of the more significant changes in season lengths and bag limits that have taken place since Alberta was made a Province. Many of the changes reflect gross changes in big game numbers. Others reflect trends in hunting pressure and an apprehensive awareness of preservation problems on the part of game administrators. Still others were meant to distribute the kill equitably among an increasing hunter horde. Unfortunately it is also true that some of the changes were the result of failure to realize the resiliency of highly productive ungulate populations. The pattern for many years was one of alternate overharvests and underharvests. Sustained maximum yields, the object of true conservation, were unknown or achieved accidentally. Only recently with the advent of a more complex zoning system have they been realized on a broad scale.

Figure I illustrates the steady increase of big game license sales from 1905 to 1958. The greatest rate of increase has been achieved since 1950. It is interesting to note that the big game harvest has kept pace with the surge in license sales and, as will be shown later, not to the detriment of big game populations. Deer numbers in particular have surged along with both harvest and license sales since 1950.

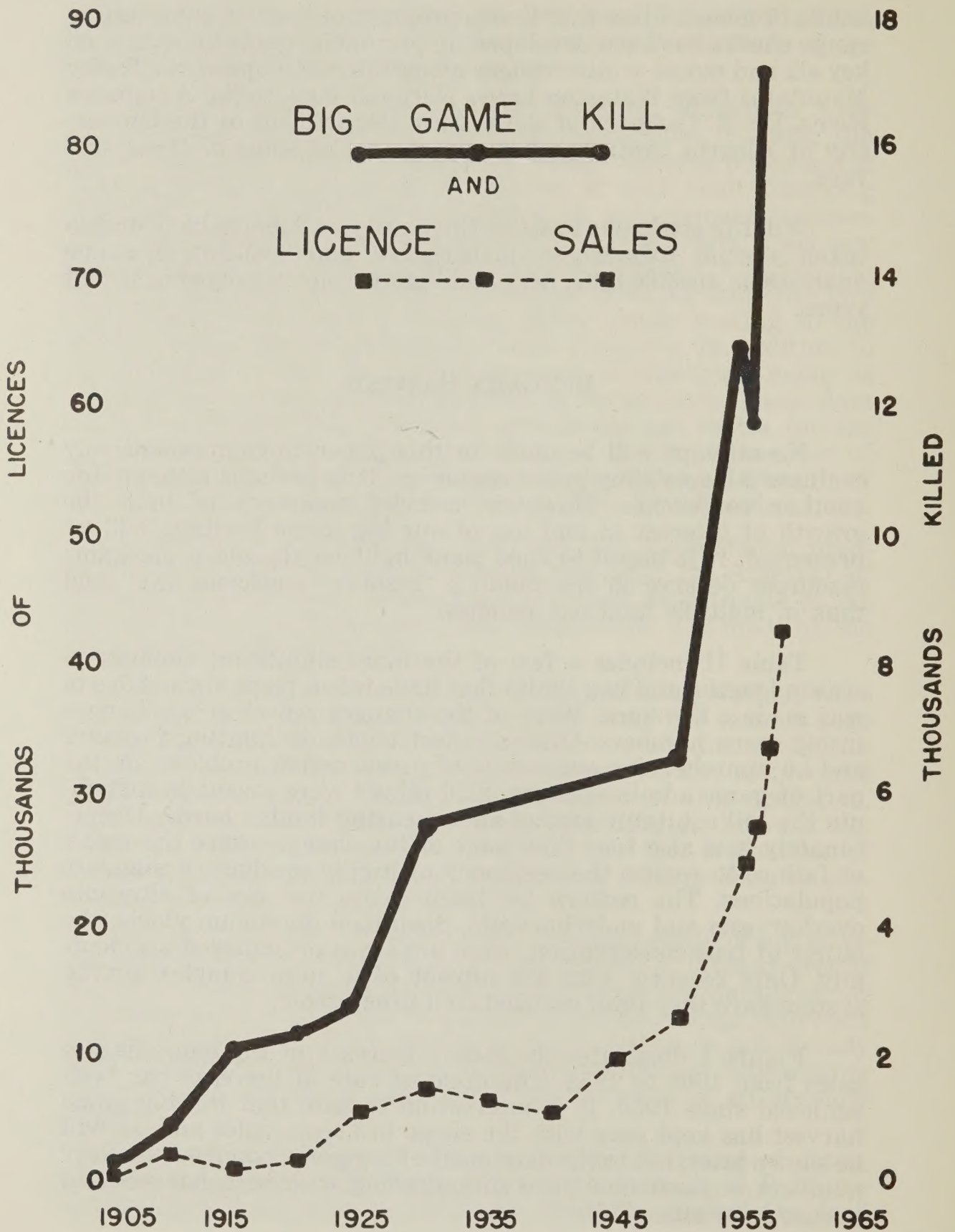


TABLE II

Big Game Season Highlights, 1905-1958

Year	Season	Bag Limits
1913—	Six week province wide season on moose, deer and antelope. —No elk season.	1 male moose +1 male deer +2 male antelope
1926—	First closed season on antelope.	1 male moose +1 male deer
1929—	First closed season on deer and moose east of highway No. 2.	1 male moose +1 male deer
1933—	First elk season in limited area.	1 male moose +1 male deer +One 10 point elk
1940—	Re-opened season on antelope.	1 male moose +1 male deer +One 8 point elk +1 antelope
1941—	Enlarged antelope bag limit.	1 male moose +1 male deer +One 8 point elk +2 antelope
1945—	First season on cow elk in Pincher Creek area.	1 male moose +1 male deer +1 antelope +1 male or female elk
1949—	Bag limits restricted. —Closed season on antelope. —First Province wide elk season.	1 male of deer, moose or elk
1950—	Closed season on moose.	1 male deer or elk
1952—	Re-opened moose season.	1 male of deer, moose or elk
1953—	Closed season on deer and moose.	1 male elk
1955—	Re-opened season on deer and moose. —Instigation of zoning system.	1 male deer or moose or one elk
1956—	Bow and arrows legal. —Antelope season re-opened.	1 male deer or moose or one elk +1 antelope
1957—	First season on doe deer and cow moose.	1 deer or moose or one elk +1 antelope

Individual hunter success has dropped since what can be termed "the old days" however. The major turning point was in 1949. Prior to that time one license allowed a hunter to take one each of three species of the deer family. After 1949 only one animal of one species was allowed per license. This drastic cut in bag limits spread the available surplus more thinly among a larger number of hunters. Fewer hunters could get a lot of meat, but more hunters could get a little.

The present general status of the big game resource is aptly demonstrated by the kill figures for 1957, the last year for which accurate data is available. In that season a total of 17,500 animals were shot by 36,000 hunters. Both figures are the highest

ever recorded in Alberta. A partial species breakdown shows that approximately 6,500 deer, 5,000 moose, 3,000 elk, 2,200 antelope and 700 other animals were shot.

An overall hunter success of slightly less than 50 percent was attained. If most of the hunters are presumed to be male approximately one in thirteen Alberta men hunted big game in 1957. One in twenty-seven obtained an animal.

VEGETATIVE TYPES OR ZONES IN ALBERTA

Individual big game species are usually associated with one or more habitat types. Each animal has definite environmental requirements that must be met if it is to successfully populate a particular area. There are, for example, climax forest species that need and thus are found only in mature subalpine or boreal forests. Similarly, there are prairie species that reach high densities only in climax grassland regions. At the same time there are animals less stereotyped in their needs, called "pioneer" species, that can adapt to the zones of transition in and between two or more outwardly dissimilar types. It follows that severe habitat changes such as fire or logging will bring about subsequent changes in the status of associated big game species and that the magnitude of the reaction will vary according to the species' adaptability. Species with rigid requirements will suffer greatly, while those with less rigid requirements (i.e. a high degree of adaptability) will suffer less and could even benefit.

In order that the following discussions of species distribution and abundance will have some ecological meaning the important vegetative regions of Alberta are described.

Map 1 follows closely the classification of forest types described by Harrison (1936). The zone outlined in black is the region in which original cover types have been severely modified by man's activities.

Each vegetative belt or type is characterized by the dominance of certain specific groups of plants, usually trees, and by a certain degree of uniformity of growing conditions throughout the area. Some tree, shrub, forb or grass species may be found in any or all of the vegetative types. It is the dominance of one plant or group of plants, not the exclusion of all others, that defines a belt. The boundaries assigned to vegetative types are only approximate. Between them are zones of tension or transition where two or more dominant forms struggle for mastery.

The vegetative types are:

1. *Grassland*—

This is our "treeless" prairie region. The chief plant communities consist of spear grass, fescues, Grama grass and

wheat grass. Sage and snowberry are common shrubs on the treeless plains. Tree cover exists only in moist sites along river valleys and coulees. Predominate tree species and associated shrubs are the cottonwood, aspen, poplar, Saskatoon, willow and buffalo bush. Small patches of conifers occur along some water courses. Ranching is the predominating agricultural practice in the south while most of the northern section has been cultivated. Several irrigation districts are found throughout.

2. *Aspen Grove or Parkland*—

Aspen is the predominant tree species. Conifers are of negligible importance. The forest cover is not continuous, consisting of scattered bluffs rather than extensive stands although some of the hills are completely wooded.

Farming is the major industry and is practiced intensively. There has been a considerable reduction in tree cover due to clearing operations. On the other hand the elimination of prairie fires has allowed the aspen to encroach upon former grasslands.

3. *Subalpine*—

The topography in this belt is rough with many peaks above timberline. Engellmann spruce and alpine fir are the principal trees. Douglas fir occurs in moderate quantities. Aspen grows in a few sheltered localities. Mountain meadows and grassy slopes above timberline are typical. Considerable logging has taken place in some localities. Extensive forest fires have ravaged this type in the past but recent damage has been light. Little or no settlement has taken place making this belt one of the remaining "wilderness" zones.

4. *Foothills*—

This vegetative type grows on a series of benches and low plateaus at the base of the Rocky Mountains. The topography is rough and deeply dissected by numerous streams and rivers. Precipitation is moderately heavy but snow is often removed by warm chinook winds.

Lodgepole pine is the principal tree species due largely to repeated fires. White spruce is the climax coniferous species. Poplars (aspen) are also present in pure and mixed stands. This region is important from a lumbering standpoint and has been logged severely along portions of its eastern fringe. Settlement has also taken place along its eastern edge, although the soil is poor.



5. *Boreal or Mixedwood*—

The most important forest types are: (1) aspen and balsam poplar and (2) aspen and poplar and white spruce. Jackpine springs up after fires on dry sites. Black spruce is found in stunted form in the numerous wet swamps and muskegs along with quantities of tamarack. Formerly large stands of merchantable timber have been seriously over cut along the southern fringe. Serious fires have ravaged central and northern sections. Southern portions have soil suitable for agriculture and are being intensively farmed. In these regions balsam poplar is well represented but white spruce is absent.

6. *Mackenzie Lowlands*—

A flat and poorly drained region occupied largely by open marshes, this type is found only in the northeastern section of the province. Poplar and spruce grow along the rivers.

7. *Northern Coniferous*—

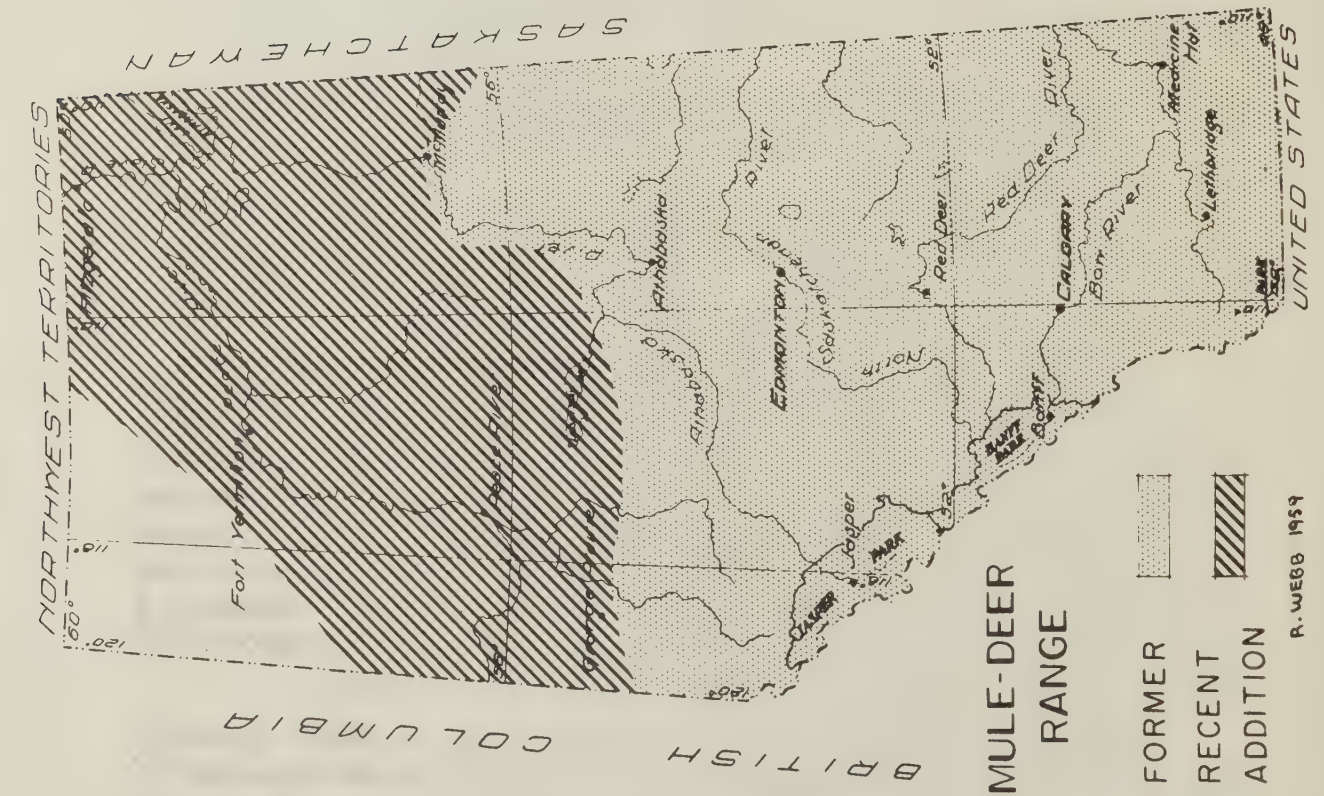
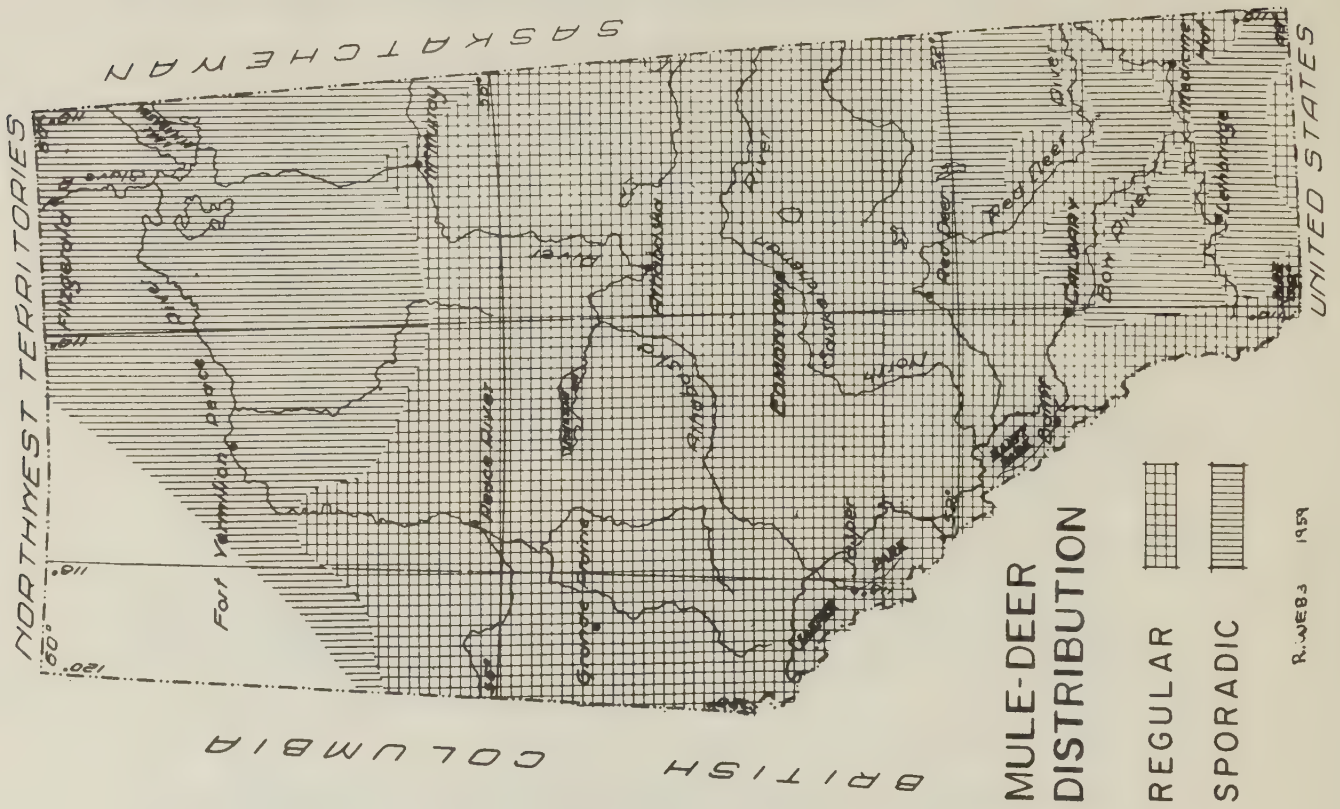
The western edge of this type follows the boundary of the Canadian Shield in Alberta. Black spruce grows in poorly drained sites around muskegs and along low ridges. Thousands of lakes dot the area. Climatic conditions are severe with long winters, little precipitation and biting winds.

BIG GAME SPECIES AND THEIR DISTRIBUTION, ENVIRONMENT, AND ABUNDANCE

The following account is meant to be only a brief outline of some of the available knowledge concerning the status of Alberta's big game animals. Numerous records have been purposely omitted to simplify the treatment.

The maps ignore occasional occurrences but try instead to convey the general impression of species distribution and abundance. The term "former" applies to distributions at the time of the fur trade i.e. (1800-1875) as best they can be determined from early records. The term "regular" is used to denote regions in which the animals are found in continuous numbers of varying intensity i.e. optimum range. The term "sporadic" implies a "hit and miss" distribution of low intensity. These regions are marginal and populations are not firmly established.

The provincial population estimates are at best "guesstimates". However, they are based on a considerable amount of factual information and therefore should be at least interesting



and useful for comparative purposes. Rest assured that Alberta's big game management plans are not based on them but have instead the more solid foundation of a network of local census figures.

MULE DEER

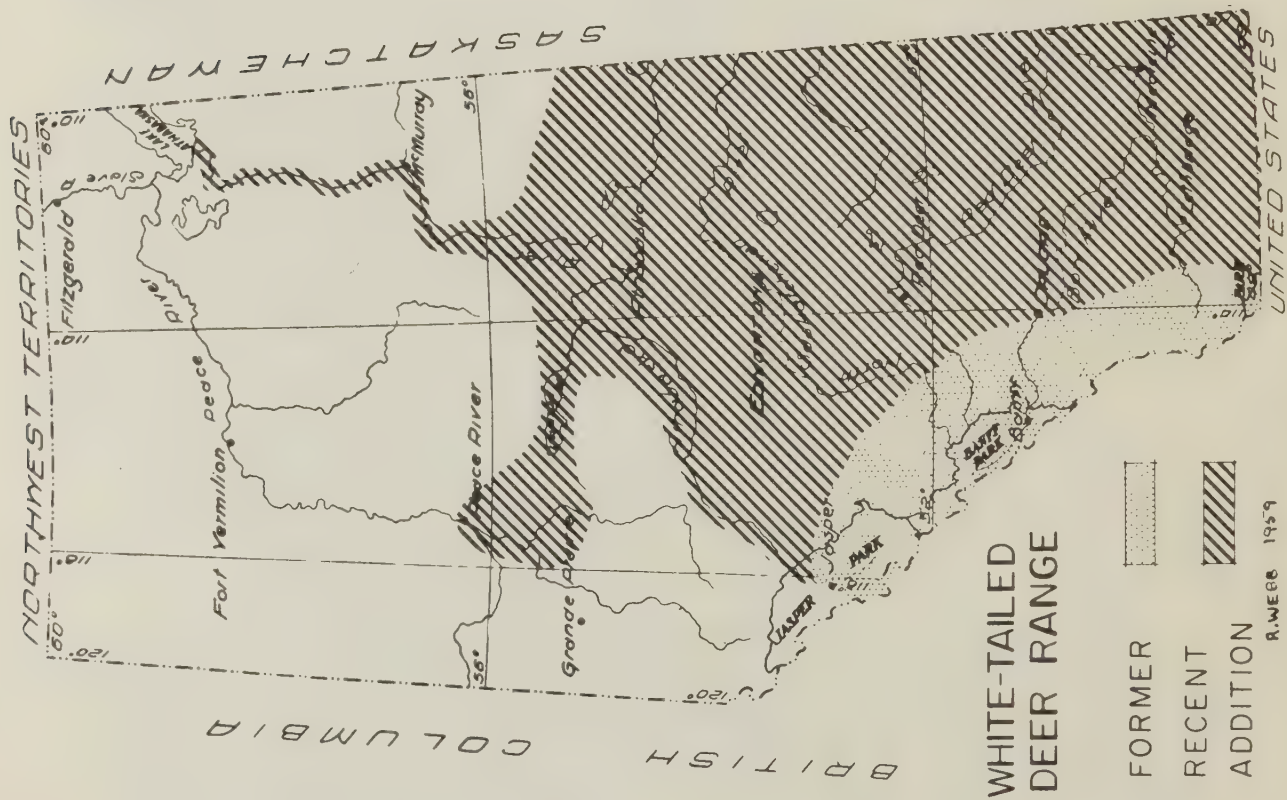
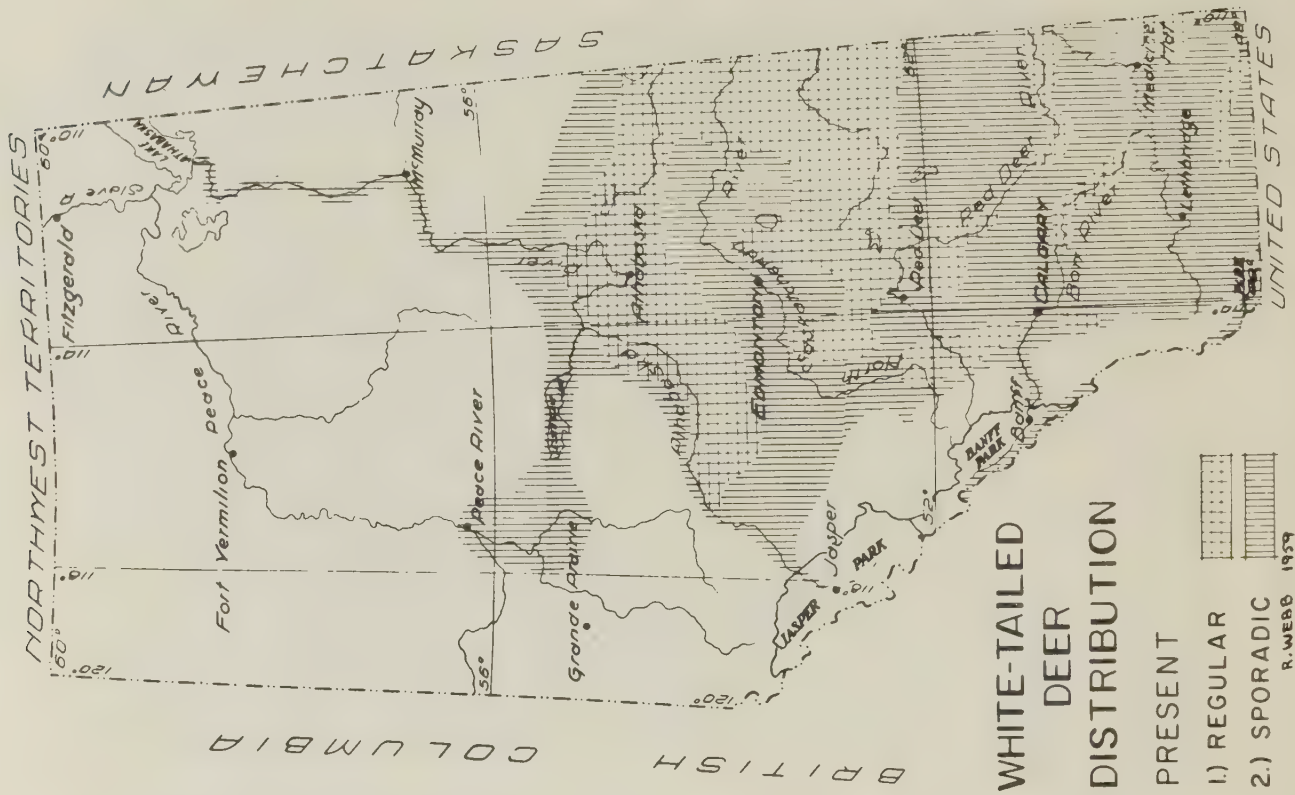
Of the six species of the deer family found in Alberta only two are known commonly as "deer". Of the two the mule deer is perhaps most typically Albertan. In early times the "jumper" or "black-tail" as it is sometimes locally known was abundant on the prairies and in most of the forested portion of southern Alberta. Then in the late 1800's their numbers dwindled due to some as yet undescribed cause. By the year 1900 the mule deer was uncommon in many portions of its former range. Since then, despite temporary setbacks, the species has increased remarkably and has pushed northward into formerly unoccupied range. (Maps 2 & 3.) Today concentrations of mule deer are found in all vegetative types except the alpine, the Mackenzie lowlands, and the northern coniferous. They are now to be found in both the Yukon and the Northwest Territories and are still moving northward.

The mule deer is an animal of the forest edge thriving on seral stages of forest succession. Extensive tracts of climax coniferous forest are not to its liking. Forest fires and logging are thus of long term benefit to the survival of the species. Its foremost enemy is overpopulation. To prevent die-offs due to this cause, antlerless animal seasons must be instigated from time to time. An estimated 175,000 exist in Alberta today making it the most abundant single big game species. It is a fine sporting animal under conditions of continuous hunting. It can be expected to remain an important game animal in Alberta under intensive management.

WHITE-TAILED DEER

The second of the two big game animals in Alberta commonly referred to as "deer" is the "white-tail" or Virginia deer. Often a brick red color in summer this species is believed to have given rise to persistent but so far unfounded stories of a third species called the "red deer".

The white-tail is a slender animal generally smaller in size than the mule deer. Large white-tail bucks, however, can weigh as much as large mule deer bucks. It is extremely wary and thus difficult to hunt even though it is often found in small patches of dense cover near or in areas of intensive cultivation. It chooses slightly different habitat than the mule deer although in the



prairie and parkland regions some overlap exists. There is little evidence of direct competition between the two species and hybridization rarely occurs. However, the ability of the white-tail to thrive and reproduce in the face of heavy hunting pressure will likely enable it to become the predominant species in areas of overlap.

White-tails were found in fair numbers in the foothills section of Alberta when the early explorers first came. (Map 4.) They probably also existed in the Cypress Hills. They were scarce or absent elsewhere, however. Their numbers dwindled to a low at the turn of the century. Since that time they have increased and spread into unoccupied range to the north and west. In recent years the upsurge has reached such proportions as to become readily noticeable to most people. An estimated 90,000 exist in Alberta at the present time with the total skyrocketing yearly. Already they far outnumber the mule deer in the eastern parklands and elsewhere. The northward advance of land clearing practises will help this animal enlarge its range still further. (Map 5.) It is the "deer of the future" for Alberta. If the present trend continues it will take the brunt of big game hunting within a few years.

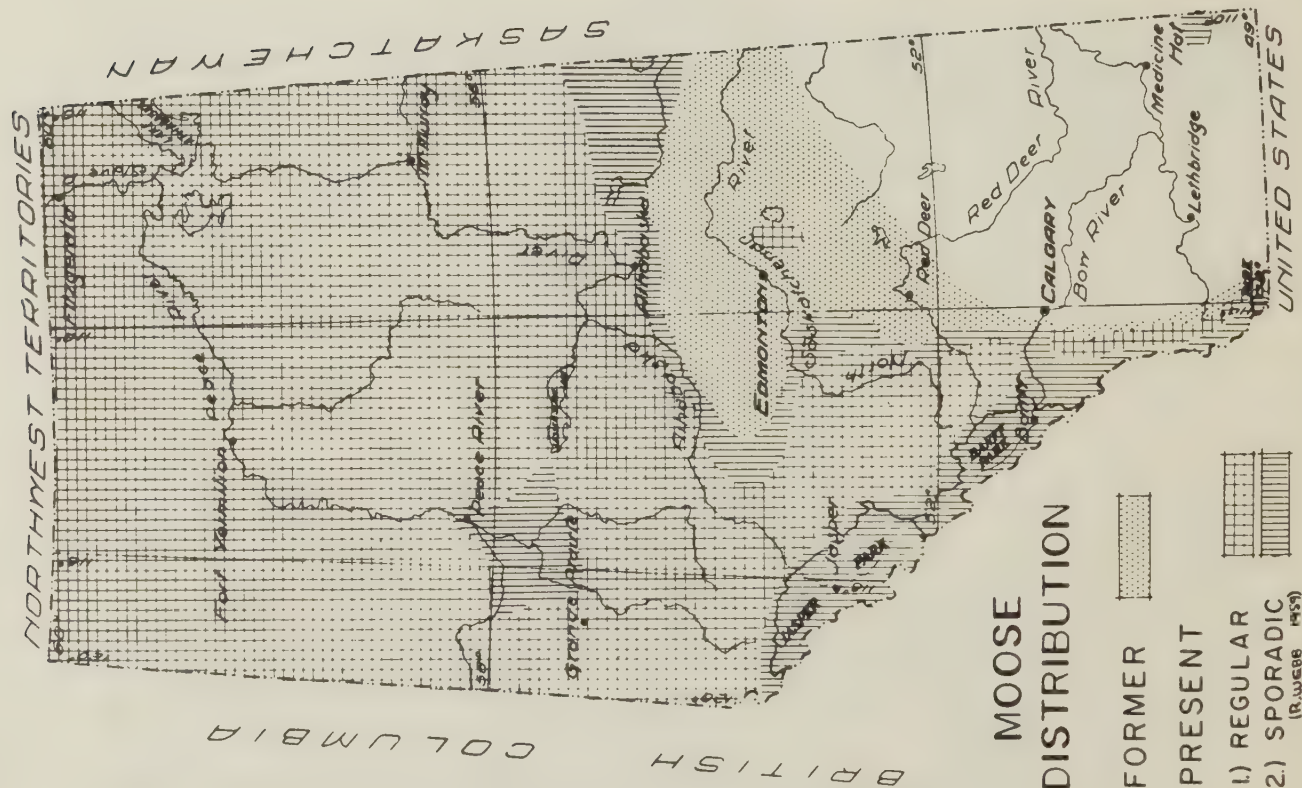
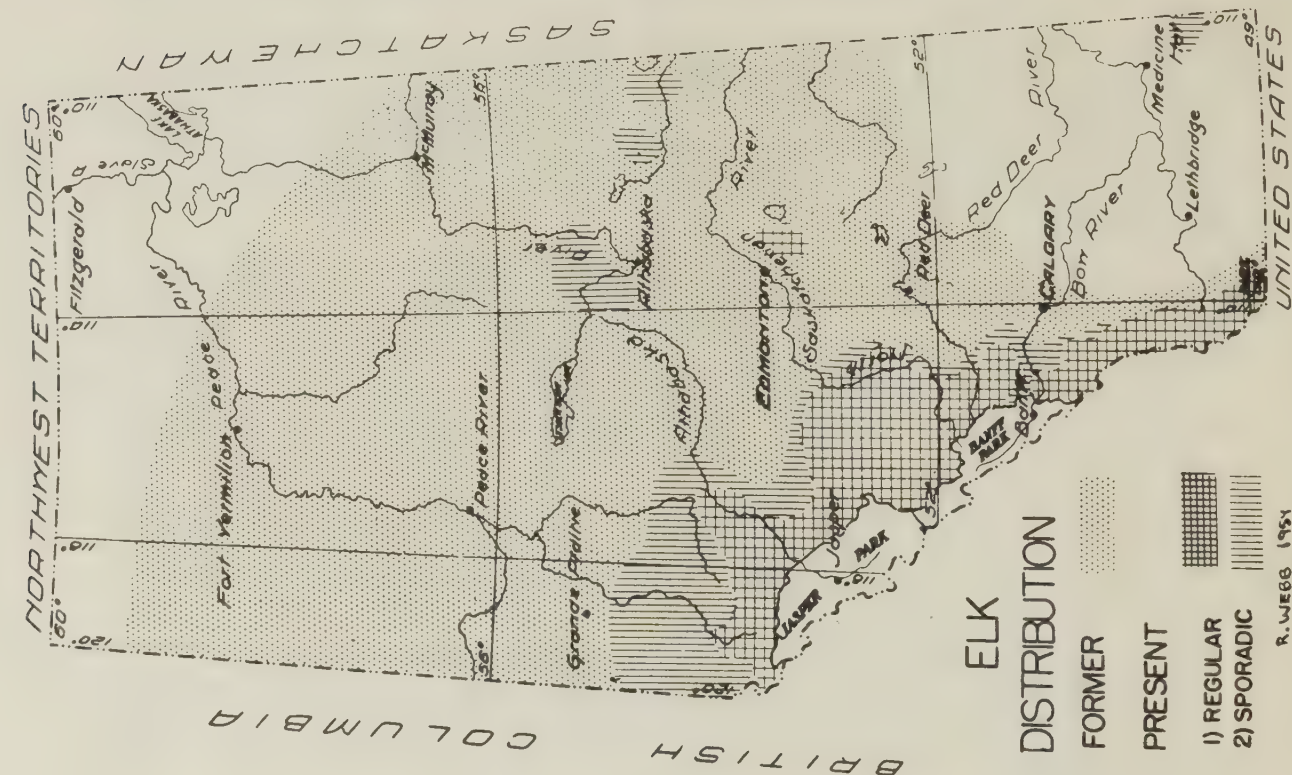
ELK

The elk or wapiti was called "the red deer" by early travellers in Alberta because of its similarity to the European stag. It was formerly abundant over almost the whole Province. (Map 6.) In 1810 Alexander Henry saw large herds near Edmonton and in the subalpine forest west of Rocky Mountain House.

A series of severe winters in the late 1800's changed the picture greatly. They were almost exterminated. By 1907 there was only an estimated 1,000 left in three regions of the Province; (1) the area now known as Elk Island Park, (2) the upper Brazeau River area and (3) the Oldman River drainage in the south.

Around 1920 the tide began to turn once more and elk began to become more numerous. Native herds increased and re-introductions were made to the National Parks and to the Cypress Hills. By 1924 the total had increased to an estimated 2,000 head. In recent years the increase has been rapid. They are re-invading much of their former range aided by recent Game Branch introductions. Around 20,000 now exist in the Province outside of National Parks.

Highest densities occur in the foothills and subalpine cover types where they graze the grassy slopes in winter.



A highly prized game animal that is difficult yet not impossible to obtain, the elk has an important place in the future of big game management in Alberta. One of its shortcomings as a game animal is that it is largely a grass feeder and thus under conditions of high density can compete with domestic stock for food. As well its predilection for stacked hay makes it incompatible with intensive cultivation. As a valuable animal of the "green areas", however, it is without parallel.

MOOSE

Map 7 shows that moose were originally found in all the forested sections of Alberta. No estimate of early numbers is available but they were numerous in some regions. Then, as with the other ungulates, numbers dwindled to an extreme low by the year 1900. The species actually became extinct in the southern foothills and subalpine zones.

Population increases in the northern mixed-wood and foothills regions after the turn of the century preceded a southward drift of moose to the southern foothills region. By 1920 moose began to reappear south of the Clearwater River and following a series of severe fires reached high densities in the late 1930's. Moose will not be able to similarly repopulate the parkland zone because of the intensive cultivation now practiced there.

Moose are primarily browse feeders. They must have a plentiful supply of succulent willow, birch or aspen twigs in order to ensure winter survival. Some types of forest fires produce vegetative types containing these plants and thus also produce moose. Conversely when the seral stages that follow fire are replaced by climax forests of spruce and pine moose browse and thus moose production declines. It follows that successful forest fire suppression means fewer moose. This phenomenon is actually occurring in the foothills belt. Yearly moose production is declining and can be expected to continue to decline because the "forest canopy" is growing taller and more dense.

Even in areas of high moose production the species has problems. Moose increase to dangerous levels in such regions unless held in check by "antlerless animal" seasons. If allowed to increase in an unimpeded manner moose invariably damage their food supply. Thus they lower the number of individuals a given unit of range can support for some time to come. In severe cases the damage is permanent.

Moose populations are high in most suitable regions of Alberta at the present time. An estimated 45,000 exist in the Prov-

ince. Moose production can be expected to decline in many areas. Antlerless animal seasons when and where deemed necessary will continue to be used as a good game management procedure.

WOODLAND CARIBOU

The western woodland caribou is a larger and darker animal than the barren-ground caribou. It formerly ranged in fair numbers throughout most of the forested region of the Province. Today five main herds are the remnants of this once widespread animal. (Map 21) No comprehensive population count has been made but forest officer and other reports indicate between 500 and 1,000 still exist in Alberta. Herds seem relatively stable at this low level.

Caribou need extensive areas of mature coniferous or mixed wood forests particularly during the winter season. Thus forest fires, logging, and settlement mitigate against this species. They must have a supply of lichens and mosses as winter food. Tree mosses are more important than reindeer mosses. Overpopulation with subsequent "eatouts" of tree mosses can cause extreme fluctuations in caribou numbers.

A general decline in numbers has taken place in North America in recent years. Easily shot they are highly prized as food by natives and bush workers. Maximum conservation measures should be extended to save this species from eventual extermination in Alberta.

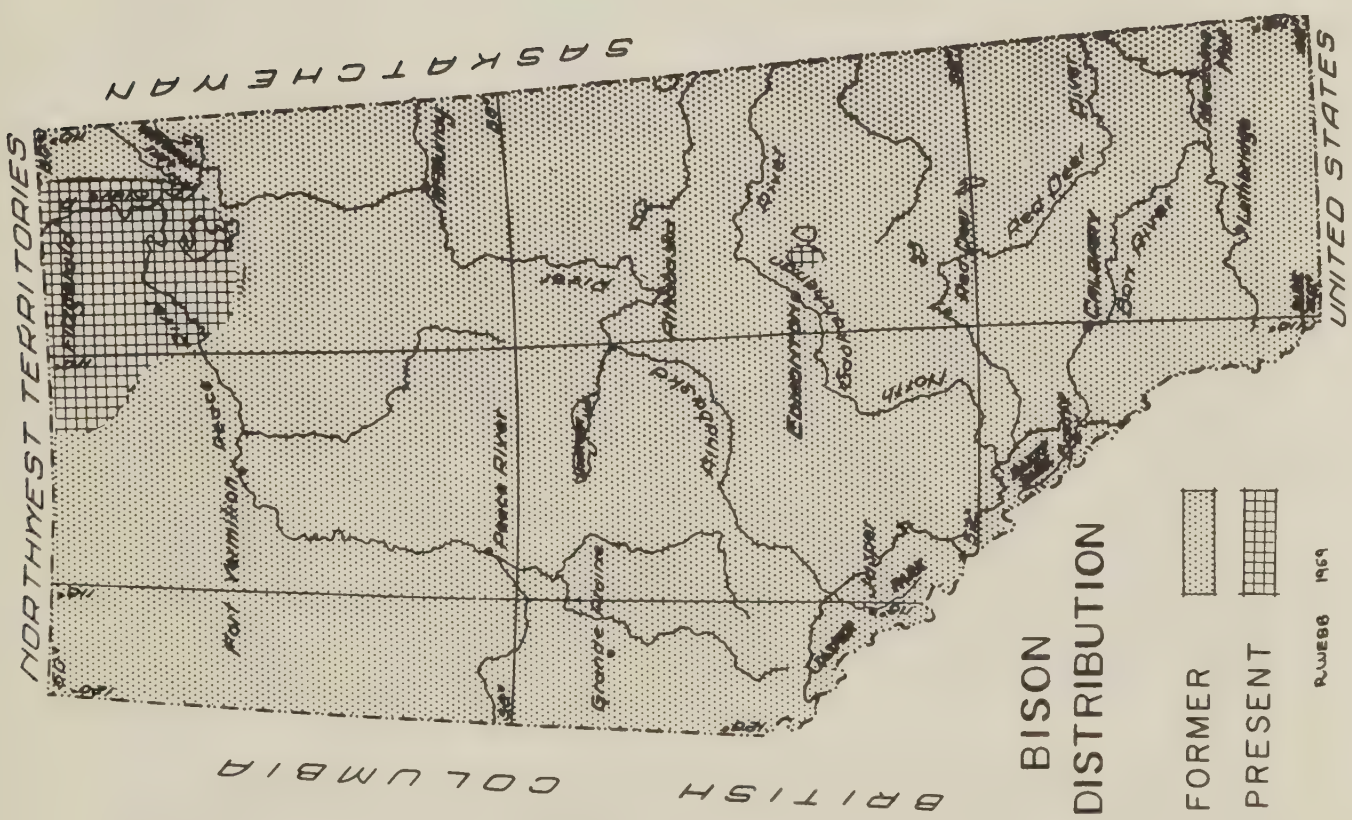
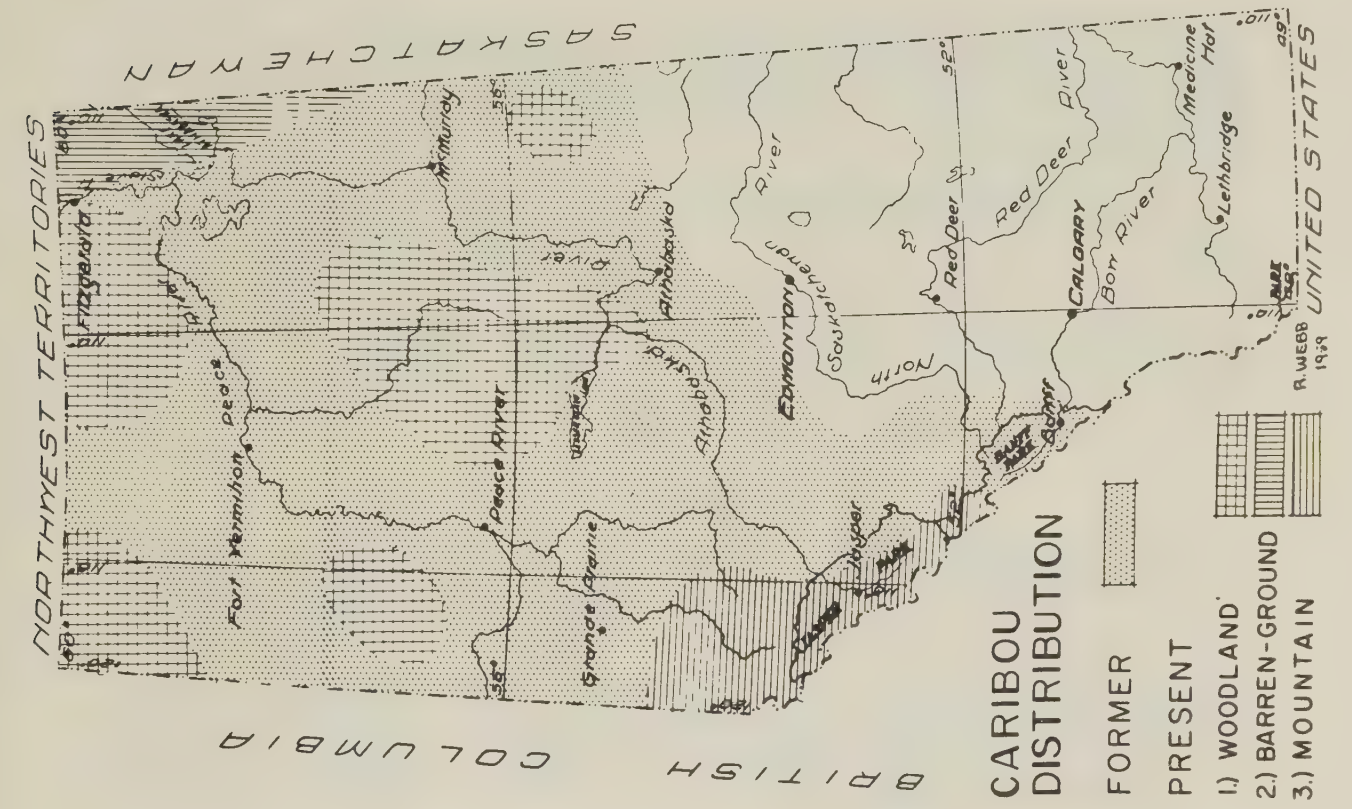
BARREN-GROUND CARIBOU

The barren-ground caribou is an irregular winter visitor to the north-eastern corner of Alberta. It is and apparently always has been restricted to the "northern coniferous" region of the Canadian Shield. On occasional years, however, the migration has been known to extend as far south as McMurray.

Little is known of the number of caribou that cross Alberta. The only available estimate was 1,500 in 1957. In recent years the number has apparently been even less.

The herds usually follow a south-easterly route across Lake Athabasca. In the past they have been much persecuted and wasted by the natives. The barren-ground caribou is at present suffering a marked decline in North America and is the subject of an intensive joint Federal-Provincial research project.

A different caribou exists in the mountain regions in and adjacent to Jasper National Park. Called the mountain caribou



its taxonomic status is uncertain and is presently being revised. It may be, as one worker believes, a third separate species of caribou, or it may be a subspecies of either the barren-ground or woodland groups.

It is a large, dark animal much prized as a trophy by sportsmen. Herds of 20-30 animals are seen occasionally in the alpine, subalpine, and foothills regions. Little status information has been accumulated for this species but reports indicate it is scarcer now than in former years. The recent establishment of a "Wilderness Park" in the region north and west of Rock Lake should aid in the preservation of the animal.

BISON

One hundred and fifty years ago vast numbers of a single species of bison or "buffalo" occupied the entire Province. There were two forms or subspecies; the southern plains buffalo and the larger, darker and less numerous wood buffalo of the north. The line of intergradation between the two was probably the northern edge of the parkland although this has never been firmly established. (Map 9.)

The plains buffalo was an important food species to the natives. Additional thousands were slaughtered for their hides by white hunters. A series of severe winters and grass fires joined with the white man and Indian to bring about the demise of this subspecies. In 1889 five of the last band (eleven) to be reported alive in Alberta were killed in the Hand Hills region. The other six were never seen again.

Meanwhile the wood buffalo was suffering a similar fate. A severe winter in 1871 greatly restricted this species in range and numbers. By 1891 there were 300 near Fort Smith, the only living buffalo left in Alberta at that time. By 1900 they had increased to an estimated 500 to 600 through rigid protection. In 1922 around 1,500 to 2,000 existed in the same area. The region known as Wood Buffalo National Park was formed that year to include the entire herd.

In the meantime steps had been taken to re-introduce the plains bison. In 1908 Canada purchased a herd of 709 from a citizen in Montana. They were placed in 160 square mile Wainwright National Park. By 1915 they had increased to 2,000. In 1923 over 2,000 excess animals were killed. In 1924 there were 8,000 in Wainwright plus another 400 in Elk Island and 25 in Banff.

A decision was then made to mix the two subspecies that had long since been separated. From 1925 to 1929 a total of 6,673

plains bison were shipped from Wainwright and added to the 2,000 wood buffalo. They multiplied rapidly and by 1945 there was a mixed herd of about 15,000 in the park plus some that had spilled out. In 1959 a season will be allowed on those outside the Park in the North-west Territories, the first since 1893. At the present time there are not enough outside the Park in Alberta to warrant similar treatment.

Barring epidemic loss the perpetuity of bison in Alberta is assured. Herds will probably be stabilized at around the present level.

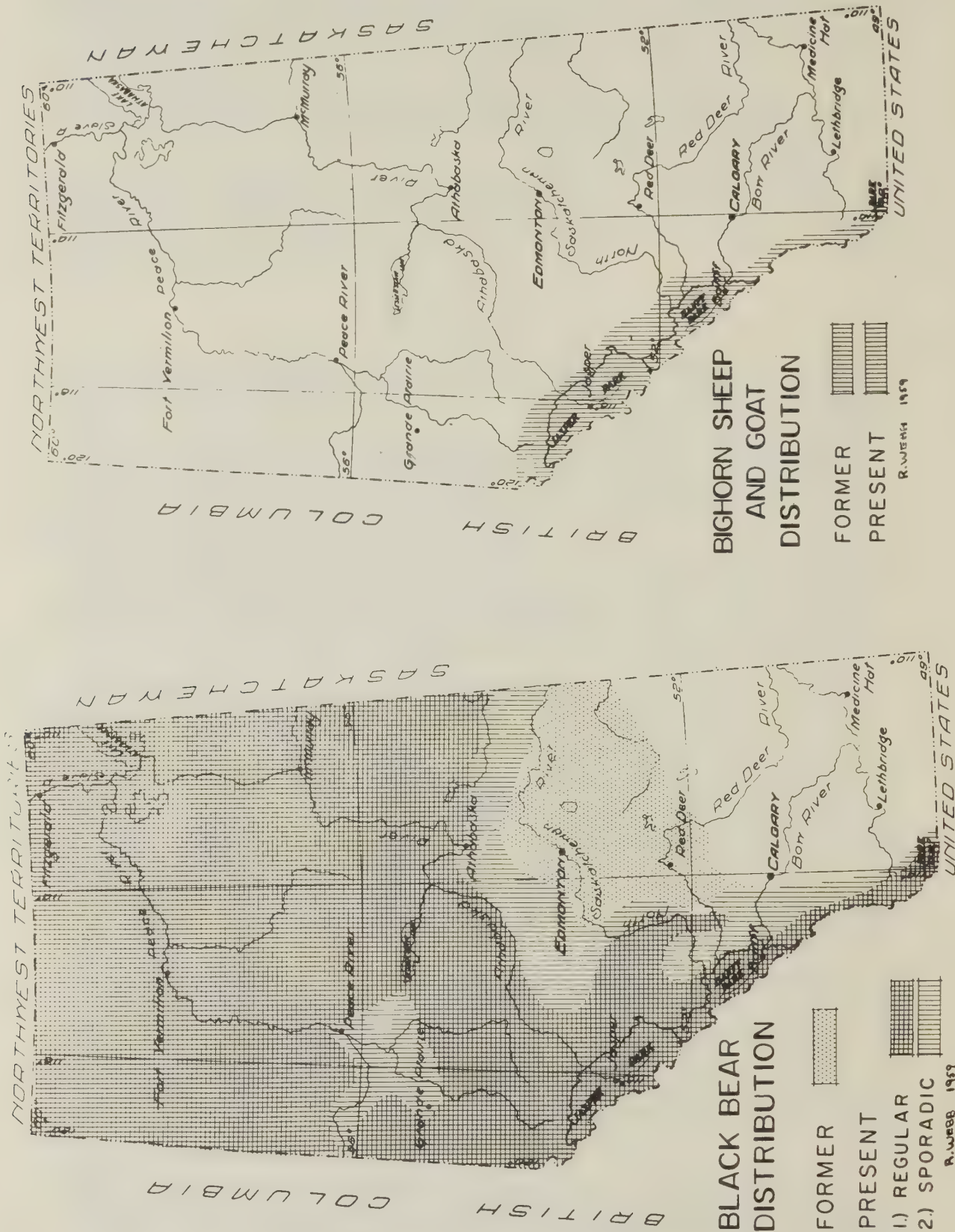
BIGHORN SHEEP

The type specimen of the "bighorn" was described from the Gap near Exshaw in 1804. Alberta is truly the home of this magnificent trophy species.

Over 200 years ago sheep may have ranged eastward into the prairie region along some watersheds by utilizing the rough cutbanks as escape terrain. By the time the white man arrived, however, they were to be found only in the foothills, subalpine, and alpine belts. (Map 10.) Their distribution has changed little since that time. They are grazing animals of the mountain slopes. In summer they feed high near timberline. In winter most of them come down low into the valleys.

Sheep numbers declined gradually until around 1920 when a slight reversal started. In 1914 there was estimated to be a maximum of 3,500 in Alberta. Approximately that number exists today. Prior to 1914 the Stoney Indians played a large role in depleting the herds. Many hundreds were shot. Now their numbers seem to be self-regulated. They may have reached a saturation point as far as available range adjacent to escape cover is concerned. At least on some ranges competition for forage with cattle or elk does *not* appear to be limiting numbers. However, on other ranges the situation may be different and bears constant surveillance. Needless to say a species as valuable as the bighorn should never be allowed to suffer at the hands of other grazing ungulates. Likewise present ranges should be protected from other harmful influences not the least of which is commercial development. The sheep is a wilderness species and wilderness areas must be maintained if they are to survive in huntable numbers.

Rams with horns $\frac{3}{4}$ of a curl or larger are the only ones that may be legally shot under existing regulations. With this system shooting can never limit the growth of populations.



MOUNTAIN GOAT

The goat's favorite habitat includes the roughest, most broken terrain in the mountains. It uses almost sheer cliffs to escape from his enemies and nearby grassy meadows and benches to feed. His home range is small. He normally travels little.

The distribution of this species in Alberta has apparently not changed since the advent of man. (Map 10.) Very little is known of its numbers either past or present. An estimate of 3,000 to 4,000 has been made for present times in Alberta. Herds seem to suffer short-term fluctuations but over the years seem fairly stable.

Although the distribution of the sheep and goat in Alberta is similar they actually choose quite different niches. Rarely are the two species seen together. Apparently little or no competition exists between the two.

It is a popular trophy game species particularly with non-resident hunters. However the difficult terrain in which it prefers to live protects it from wanton slaughter. The advent of a complex system of roads in the wild regions it haunts, however, will necessitate the accumulation of additional knowledge of the status of this animal.

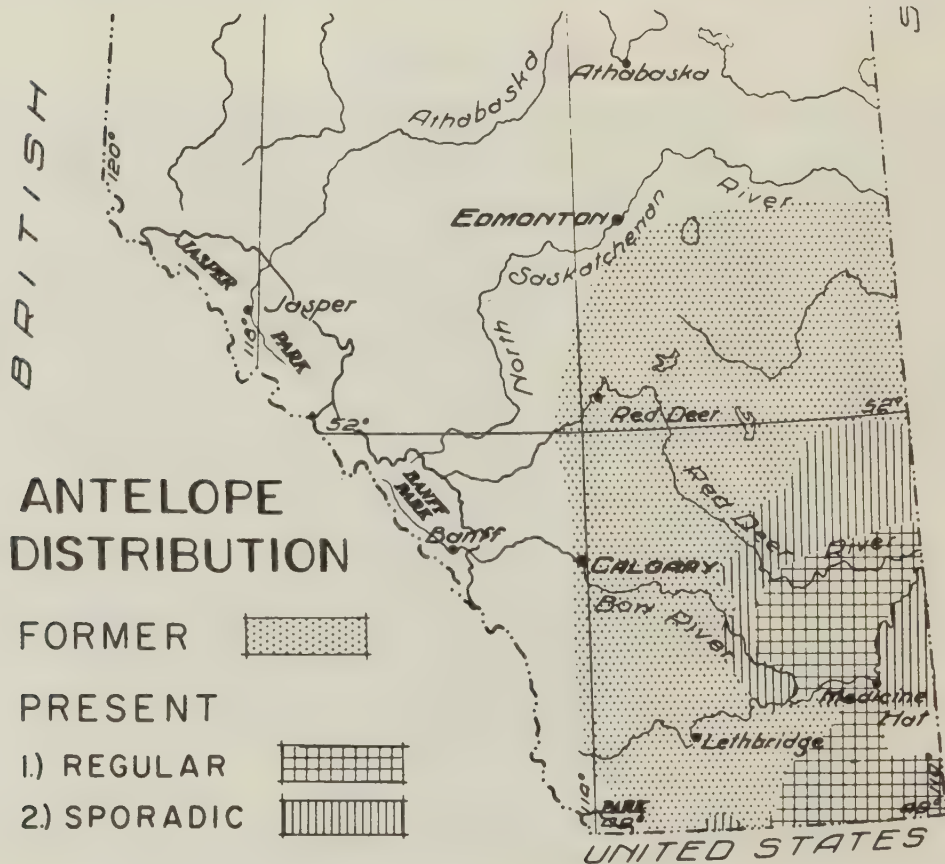
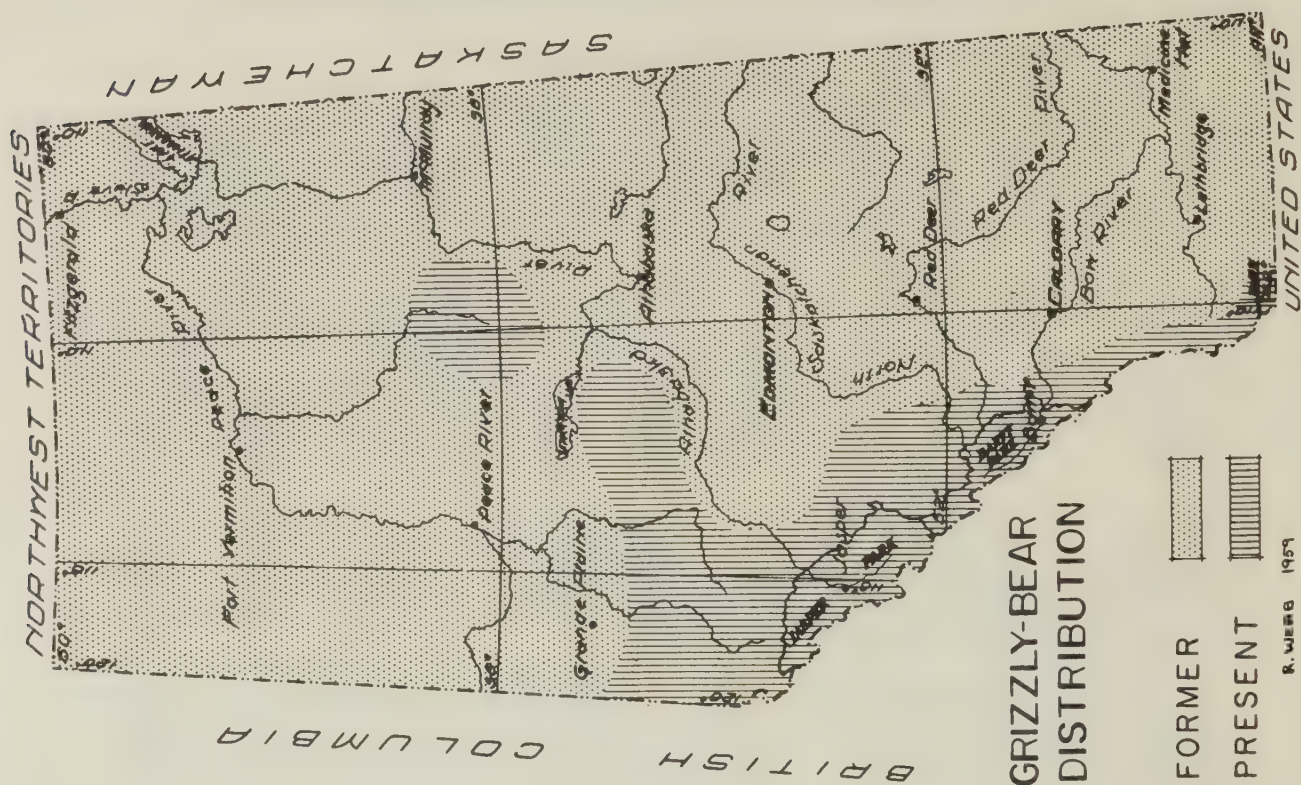
BLACK BEAR

Records of this carnivore from the early period of exploration are scarce. Most of the accounts of meetings with bears describe skirmishes with its larger relative, the grizzly. The few references located, however, indicate its former distribution was broad, in fact the whole forested area of the province. Map 11 indicates they could be found in all vegetative zones including the parkland. They were once present in the Cypress Hills, becoming extinct there in 1911.

A few probably roamed the water courses of the grassland region as indeed happens occasionally in present times. The frequency of this occurrence precluded showing it on the map.

Intensive settlement of the parkland region from 1900 to 1920 pushed the southern and eastern limit of its range to a line north of the North Saskatchewan River. For obvious reasons black bears cannot be tolerated in an area of intensive agricultural development. Where they still occur in marginal farming areas they are constantly persecuted for some alleged and some real depredatory tendencies.

They are legally a game animal but are still not highly regarded as such by local hunters. Few people specifically hunt for



bear but many shoot them when the chance offers itself. Many are needlessly shot in wilderness regions by bush workers associated with development companies on the pretext of protection of property.

Habitat change has not seriously affected numbers or the distribution of this species. They are animals of the forest edge associated with mixed stands of poplar and spruce on dry sites usually along watercourses.

No biological surveys of this species have been undertaken in Alberta. A few generalizations can be made as to numbers, however. J. Dewey Soper (1942) found them common in favored areas throughout Wood Buffalo Park. In another report (1948) he reports them in the entire Peace River block except the islands of intensive settlement. Recent increases have apparently occurred for now many bears have invaded settlement. Soper found them as far south as Clyde and Athabasca, very common in the Swan Hills, north of Slave Lake, around Sturgeon Lake, the Saddle Hills, west of Spirit Lake and north of the Clear Hills. The author found them extremely common in the Hay Lakes district of northern Alberta in 1955. Their occurrence was irregular, however, seemingly dependent on current berry crops.

The present day centre of abundance is western Alberta north of Highway Number 16 to the Clear Hills and beyond. They are not abundant along the east slope. Little is known of numbers in northeastern Alberta but they are probably regularly distributed there. Harper (1932) found them common along the Athabaska from Athabaska north to Wood Buffalo Park.

A reasonable guesstimate of present day numbers would seem to be 20,000 animals. They are not in immediate danger of extinction by any means. However, they can be easily shot, reproduce slowly, and thus should be closely watched. As the north is developed numbers will decrease.

GRIZZLY BEAR

Map 12 indicates that grizzlies were found throughout the Province in former times. A large plains grizzly was associated with the plains buffalo. Never abundant it disappeared with the buffalo and the coming of white man's civilization.

Formerly a brazen, fearless animal the grizzly has learned respect for man and now exists successfully only in remote wilderness areas. The largest numbers of grizzlies that remain are to be found in the foothills and subalpine belts. A few animals still exist in sections of the mixed-wood forest.

The Swan Hills grizzly is thought by some to be a remnant population of the plains animal. To protect it a "grizzly protective area" incorporating the most important grizzly range was designated. The animals' future, however, is still in doubt. Many are shot by field workers of development companies usually as a result of prejudice and mistaken fear. This lordly creature, highly prized by legitimate sportsmen as a trophy, needs absolute protection from indiscriminate shooting if it is to survive.

An estimate of 2,000 grizzlies over its entire range in Alberta has been made. Because of its low reproductive capacity little shooting can be tolerated. In fact little disturbance of any kind can be tolerated by the grizzly. Intensive commercial development will undoubtedly lead to its ultimate extinction in at least portions of its range. To preserve the grizzly tracts of wilderness will have to be set aside in which development is *prohibited for all time*.

ANTELOPE

Antelope formerly ranged throughout the treeless plains, north into the parkland and west to the eastern edge of the foothills. They were extremely numerous when the first explorers crossed the plains. Severe winters, predation, and the encroachment of man forced them back to the very southeastern corner of the Province and sharply reduced their numbers.

In 1919, only 3,000 animals were left in Canada. By 1924 there were only 1,400, eleven hundred of which were in Alberta. Six hundred were in the southeastern corner of the Province, 300 around Lake Newell, and 180 in the antelope reserve at Nemiskam.

Since 1930 the species has increased with only minor setbacks. By 1945 there were an estimated 15,000 in Alberta, approximately the same number as there are today.

The antelope feeds on grasses, forbs and shrubs. Of particular importance in winter are shrubs and forbs. It is *not* a serious competitor with cattle for grass. A highly sporting animal that affords a good trophy the antelope has been prized by sportsmen since 1956 under a system of controlled shooting invoked by the Provincial Game Branch. In 1958 a limit of 2,500 shooting permits were sold. The number was set on the advice of Government game biologists.

Continued controlled shooting of antelope in Alberta can be expected. Numbers will likely not increase greatly although in recent years a slight northward trend in distribution has been noticed. A few animals are again appearing along the parkland fringe. Severe winters may occasionally reduce herds. In most cases nothing can be done to circumvent this.

QUESTIONS

Question 1—In a recent ranch publication it stated that Brucellosis has been found in moose and elk and has now passed it on to domestic cattle. Do you agree with this theory or is it vice versa?

Answer—Brucellosis has been found in moose and elk, it is true. It is possible that cattle could receive the disease through contact with wild animals. The reverse is also possible.

Question 2—Does summer grazing by cattle increase food supply for deer?

Answer—No studies to directly determine the answer to this question have been undertaken in Alberta. It is considered unlikely that the answer is yes. It is recognized, however, that on some deer ranges in the United States sagebrush and other shrubs that increase with excessive grass utilization by cattle are important to deer as winter food. On some of those ranges the answer could conceivably be yes.

Question 3—In view of the low harvest of mule deer in many regions of the province, do you not think that increased seasons and bag limits may be warranted. (i.e. in certain areas).

Answer—Yes, locally. This implies a more complex system of zoning than we are using at present.

Question 4—You stated that Provincial hunter success is 50%. East Slope records for past few years indicate 16% success and covers large % of total hunter population. Why the discrepancy?

Answer—The “less than 50 percent” figure includes antelope for which hunter success is very high and also takes into account that hunters may take several trips in a season. In other words it is not a “one trip” success figure but a figure based on a full season’s activities.

Question 5—What does payment amount to by Federal Government to Provincial Body to cover cost of Indian utilization of natural resources particularly big game? Why can B.C. stop the Indian slaughter of game throughout the year and not Alberta? Is it because that Alberta prefers that Federal subsidy to cover Indian depredations at the expense of Big Game?

Answer—To my knowledge the Federal government makes no payment for big game taken by Treaty Indians to the Provincial government.

Question 6—An Experimental Buffalo transplant?

Answer—Buffalo transplants to several regions that come to mind would probably be successful. However, the advisability of the idea is in doubt. You would in most cases be adding grazing pressure to range already utilized by either horses, cattle, or elk or combinations of all three.

Question 7—When you open the female elk season presumably because of food supplies—with the other hand you increase the number of cattle on range. How come?

Answer—Elk and cattle on the same range do not always compete. However, occasionally they can and do. It is the policy of those who issue grazing permits for cattle to avoid increasing cattle use of critical winter elk range. If this is not the actual practise then it should be.

Question 8—Could more information be supplied on the homo sapiens shown in the slides?

Answer—Yes. Consult Arthur Miller, playwright, New York City, N.Y.

Question 9—Any evidence of interbreeding between mule and whitetail species?

Answer—Hybrids have been produced in captivity. They probably occur very rarely in the wild.

Question 10—Is controlled burning a feasible management tool for moose range in Alberta?

Answer—It is a management tool to be seriously considered. Burning can certainly increase moose production. The word "control" presents the problem.

Question 11—Have you any evidence of whitetail-mule deer competition in regions where both species overlap? If so, would that range preferences of the two species conflict or would you think that it would tend to keep the two deer apart?

Answer—Generally, little direct conflict or competition occurs between the two species. However, where both species exist

on homogeneous tracts of land in large numbers competition for space or food or both could occur.

Question 12—When population of caribou and grizzly are admittedly at an uncomfortable low in Alberta, should we not then more rigidly or perhaps eliminate the hunting thereof until the numbers increase appreciably, plus maintaining sizeable wilderness areas for them?

Answer—Out of season killing of both caribou and grizzly should be dealt with severely. In season killing, at least at present day rates, does not seem to be the factor limiting population growth in either case. Both species need close study, however. Wilderness areas free from commercial encroachment will, in the last analysis, be the only move that will save either species from eventual extinction in Alberta.

Question 13—Is there any estimate of Indian and Poacher slaughter of Game? It seems to us that this is enough to offset our controversial cow-moose season.

Answer—Yes, estimates have been made and allowed for in the setting of female moose seasons in Zones 9, 10 and 11.

Question 14—Would you consider it sound to introduce elk to an area well populated with moose, and in which the forage is principally browse?

Answer—It would depend on the eventual use to be made of each species and the population levels to be allowed in the seeded area. Severe competition, although possible, need not be allowed to occur.

Question 15—What is the reason for the grizzly disappearing?

Answer—The grizzly will not tolerate or be tolerated by advancing civilization. They gradually retreat from heavy used areas or are removed from them because of fear of depredation, et cetera.

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